86. Al Aoua, the howling dog = β, η, γ, δ, and ϵ Virginis.

88. Not in Al Tizini. The scribe has written R.A. 277° probably for 287°

89. Al Simak. The meaning of this word is obscure. *Cf.* Ideler and Schjellerup.

91. In the Declination the scribe has written ع for ح.

93. Error in Declination of 13° يج for 38° لح

95. R.A. and Declination both wrong. The correct Declination is written against 94. Al Ferkadain, the Calves = β and γ Ursæ Minoris.

96. The meaning of the name Al Fecca is quite obscure. Declination is erroneous.

97. Al Niyat means "the vein which suspends the heart," and applies to σ and τ Scorpii, situated on each side of the heart of the Scorpion.

98 and 99. The Declinations should be interchanged.

100 and 101. Al Sabyk. Lane gives the meaning as "preceding," and says it is applied to stars which precede others. The Declinations of both stars are wrong for ζ and η Ophiuchi.

102. The name is clearly written, الحادي, Al Hadi, which is probably a mistake for الجاثي. The R.A. and Declination do not accord with any star in Hercules or Ophiuchus.

101 to 104. The Declinations of these stars are all wrong, and they suggest that the scribe has taken from Al Tizini by mistake the Declinations of 276, 277, 278, and 280, instead of 280, 281, 282 and 283. A comparison of the two catalogues here offers from these errors the strongest evidence of the source whence all the positions were obtained. The Declinations of 101 to 112 are mostly erroneous.

104. In the description الحاوي is written for الجاثي.

105. Al Shaoulat, "the upraised tail of the Scorpion" = υ and λ Scorpii.

107 to 109. In the description الجاني is written for الجاثي.

Note on the Proper Motion of Arcturus. By W. T. Lynn, B.A.

The large southerly proper motion of *Arcturus* was noticed by Halley so long ago as 1718, and twenty years afterwards Cassini II. estimated that its latitude had changed by about five minutes between the time of Tycho Brahé and his own, a century and a half later. Hornsby has an elaborate paper (read 1772 December 24) on it in vol. lxiii. of the *Philosophical Transactions* (p. 93), in which he determined the star's southerly proper motion to amount to $2' 36''{\cdot}81$ in seventy-eight years, or about $2''{\cdot}01$ annually. This value is remarkably near the truth.

As it seems to me that the value now usually adopted is slightly too small, I have made a new determination from com-

paratively recent Greenwich observations, which forms the subject of this note. In the first place I have compared the R.A. and N.P.D. in Pond's Catalogue of 1112 stars for 1830 with the Ten-year Catalogue for 1880, and secondly I have compared together the places given in the Nine-year and Ten-year Catalogues respectively. The two results are very close, as might be expected from the large number of observations included in the catalogues; and they, therefore, probably represent the true amount of motion with great accuracy.

Pond's place for 1830 is R.A. $14^h\ 7^m\ 54^s{\cdot}63$, N.P.D. $69°\ 55'\ 42''{\cdot}70$. The precession in R.A. is $+2^s{\cdot}8132$, and the mean precession in N.P.D. for the interval between 1830 and 1880, allowing for the secular variation, is $+16''{\cdot}962$. Applying these for fifty years, we find the place reduced to 1880 is R.A. $14^h\ 10^m\ 15^s{\cdot}29$, N.P.D. $70°\ 9'\ 50''{\cdot}80$. The actual place for that year in the Ten-year Catalogue is R.A. $14^h\ 10^m\ 11^s{\cdot}286$, N.P.D. $70°\ 11'\ 32''{\cdot}09$. The differences are $-4^s{\cdot}004$ in R.A. for fifty years, or $-0^s{\cdot}080$ annually; and $+1'\ 41''{\cdot}29$ in N.P.D. for fifty years, or $+2''{\cdot}02$ annually.

The place in the Nine-year Catalogue for 1872 is R.A. $14^h\ 9^m\ 49^s{\cdot}390$, and N.P.D. $70°\ 9'\ 0''{\cdot}09$. The mean precession is in R.A. $+2^s{\cdot}8132$ and in N.P.D. $+16''{\cdot}9135$, making for eight years $+22^s{\cdot}505$ and $+2'\ 15''{\cdot}31$ respectively. Applying these, the place reduced to 1880 is R.A. $14^h\ 10^m\ 11^s{\cdot}895$ and N.P.D. $70°\ 11'\ 15''{\cdot}40$. Comparing these with the place in the Ten-year Catalogue, given above, we find the annual proper motion of the star to be $-0^s{\cdot}0761$ in R.A. and $+2''{\cdot}086$ in N.P.D. It is evident that the actual proper motion in N.P.D. exceeds two seconds, though that used in the last Greenwich Catalogue is $+1''{\cdot}977$ (slighly larger than the B.A.C. value), which seems to be about $0''{\cdot}1$ too small. The proper motion in R.A. seems to be a little less than $-0^s{\cdot}08$, which the value assigned in the Ten-year Catalogue ($-0^s{\cdot}0799$) approaches very closely indeed.

For a further check, I have compared the place in the Greenwich New Seven-Year (epoch 1864) with that in the Ten Year. In forming these, as well as that in the Nine-year Catalogue, the fractional parts of the proper motion were applied to the result of each observation. Whether Pond did so or not seems doubtful. The so-called annual precession for *Arcturus* in his catalogue is in N.P.D. what we should call annual variation, and includes the proper motion as determined by Baily; but whether the fractional parts were used in reducing the separate observations does not appear.

The place in the Greenwich New Seven-year Catalogue is R.A. $14^h\ 9^m\ 27^s{\cdot}52$, N.P.D. $70°\ 6'\ 29''{\cdot}32$; that in the Ten Year is R.A. $14^h\ 10^m\ 11^s{\cdot}286$, N.P.D. $70°\ 11'\ 32''{\cdot}09$. The mean annual precession is in the former element $+2^s{\cdot}8131$, and in the latter $+16''{\cdot}923$; for sixteen years, $+45^s{\cdot}010$ and $+4'\ 30''{\cdot}77$. Comparing, then, the First Seven Year place reduced to 1880 (R.A. $14^h\ 10^m\ 12^s{\cdot}53$, N.P.D. $70°\ 11'\ 0''{\cdot}09$)

with that in the Ten Year, we find the annual proper motion in R.A. to be $-0^{s}\cdot078$ and in N.P.D $+2''\cdot0000$. This value is probably very accurate. The number of N.P.D. observations in the New Seven-Year is 103, and in the Ten-Year 184.

Blackheath: 1895 *May* 22.

Note on the Binary ι Leonis. *R.A.* $11^{h}\ 18^{m}\ 27^{s}$, *Dec.* $11^{\circ}\ 6'\cdot5$, 1895. ($3^{m}\cdot9$ *and* $7^{m}\cdot1$.)

By Alice Everett, M.A.

(*Communicated by T. Lewis.*)

Mr. Lewis, who had a suspicion that the companion star had passed the apse of its apparent orbit since Struve's time, suggested this binary among others to me for discussion. I have examined the measures, and, unless appearances are very misleading, think there is little doubt that the apse was passed recently, probably in the neighbourhood of 1880, and also, that maximum apparent distance was passed towards the end of the 'seventies, and that the distance is now diminishing comparatively rapidly. Another ten or fifteen years should settle the question, and as there seems to have been a tendency of late years to let the star drop out of observation, it is perhaps worth while to mention that there is at least a possibility that it is now at a rather critical part of its period. Measures were frequent from the time of Struve's first observation in 1827 until about 1883. I have not found any for the years 1885, 1890, 1891, 1892, and of those in the intervening years no two are by the same observer. This year's observation was made with the Greenwich 28-inch. The latest measures give—

1893·35	$\theta = 59^{\circ}\cdot5$	$r = 2''\cdot625$
1895·29	$\theta = 58\cdot2$	$r = 2\cdot492$

The position angle has diminished about 40° since 1827. The period can scarcely be less than a century and a quarter; I am inclined to think it is nearer two centuries, and it may be a good deal more. At the present stage the computation of a satisfactory orbit is out of the question, but I have made an attempt at a provisional orbit with the view chiefly of getting a trial ephemeris for the next few years. The results are—

P = 178·6 years	$\Omega = 40^{\circ}\ 15'$
T = 1750·6	$\lambda = 249^{\circ}\ 0'$
$e = 0\cdot7566$	$a = 2''\cdot486$
$\gamma = 65^{\circ}\ 40'$	$\mu = -2^{\circ}\cdot016$